CLAIMS

What is claimed is:

1. A leaf color chart, comprising

(a) a planar, rectangular, plastic support structure; and

(b) a plurality of color panels carried by said support structure, each said color panel having a different shade of green, each said shade of green relative to nutrient content in a plant leaf.

2. A leaf color chart as recited in claim 1, wherein the colors in said color panels are based on the spectral reflectance characteristics of said plant leaf at different nutrient states.

3. A leaf color chart as recited in claim 1, wherein the colors in said color panels are based on the spectral reflectance characteristics of said plant leaf at different nitrogen states.

4. A leaf color chart as recited in claim 1, wherein the colors in said color panels are based on the spectral reflectance characteristics of said plant leaf at different phosphorous states.

5. A leaf color chart as recited in claim 1, wherein the colors in said color panels are based on the spectral reflectance characteristics of said plant leaf at different potassium states.

6. A leaf color chart as recited in claim 1, wherein the colors in said color panels are based on the spectral reflectance characteristics of said plant leaf at different magnesium states.

7. A leaf color chart as recited in claim 2, wherein said spectral reflectance characteristics comprise:

(a) a luminescence designation taken from said plant leaf;

(b) a red-green chromaticity designation taken from said leaf;

(c) a yellow-blue chromaticity designation taken from said leaf; and

(d) combining said luminescence, red-green and yellow-blue designations to define a color.

8. A leaf color chart as recited in claim 7, wherein said colors of said panels are selected by partitioning the blue-yellow spectral scale into a plurality of discreet ranges, each panel of said chart having a reflectance corresponding to one of said ranges.

9. A leaf color chart as recited in claim 1, wherein the colors of said color panels are based on the yellow (b+) spectral reflectance characteristics of said plant leaf at different nitrogen states.

10. A leaf color chart as recited in claim 1, wherein said colors of said panels have a spectral profile, said spectral profile comprising reflectance values for a variety of a plant taken at incremental wavelengths within the range of visible light, said panel configured to have virtually the same spectral profile as the plant across the same range of visible light.

11. A leaf color chart as recited in claim 10, wherein said spectral profile of said panel comprises a set of reflectance values with a chromatic component in a red-green scale, a chromatic component in a yellow-blue scale and a luminescence component.

12. A system for determining nitrogen status of plants, comprising:

(a) a leaf color chart having a plurality of color panels, each color panel having a different shade of green;

(b) a calibration table comprising an array of nutrient level entries, said table having a plurality of columns indexed according to an identifying number associated with each said color panel, said table having a plurality of rows indexed by the variety of plant, wherein said table provides a leaf nutrient level value in percent; and

(c) an assessment chart comprising a graph of nutrient status based on the leaf nutrient level value derived from said calibration table compared to the plant growth stage for a plurality of varieties of plants, said assessment chart having a plurality of colored regions indicative of the nutrient status of the plants, as being adequate, critical, deficient, or excessive.

13. A system for determining nutrient status of a plant as recited in claim 12, wherein the colors in said color panels of said leaf color chart are based on the spectral reflectance characteristics of a plant leaf at different nitrogen states.

14. A system for determining nutrient status of a plant as recited in claim 13, wherein the colors of said color panels of said leaf color chart are based on the yellow (b+) spectral reflectance characteristics of a plant leaf at different nitrogen states.

15. A system for determining nutrient status of a plant as recited in claim 12, wherein the colors in said color panels of said leaf color chart are based on the spectral reflectance characteristics of a plant leaf at different potassium states.

16. A system for determining nutrient status of a plant as recited in claim 12, wherein the colors in said color panels of said leaf color chart are based on the spectral reflectance characteristics of a plant leaf at different phosphorous states.

17. A system for determining nutrient status of a plant as recited in claim 12, wherein the colors in said color panels of said leaf color chart are based on the spectral reflectance characteristics of a plant leaf at different magnesium states.

18. A system for determining nutrient status of a plant as recited in claim 12, wherein the nutrient level entries in said calibration chart are based on observed nitrogen levels of a particular plant variety in plant leaves exhibiting a characteristic color.

19. A system for determining nutrient status of a plant as recited in claim 12, wherein the nutrient level entries in said calibration chart are based on observed phosphorous levels of a particular plant variety in plant leaves exhibiting a characteristic color.

20. A system for determining nutrient status of a plant as recited in claim 12, wherein the nutrient level entries in said calibration chart are based on observed potassium levels of a particular plant variety in plant leaves exhibiting a characteristic color.

21. A system for determining nutrient status of a plant as recited in claim 12, wherein the nutrient level entries in said calibration chart are based on observed magnesium levels of a particular plant variety in plant leaves exhibiting a characteristic color.

22. A method for determining nutrient status of plants, comprising:

comparing a plant leaf to a color panel on a leaf color chart having a plurality of color panels, each color panel having a different shade of green, each color panel having a identifying number;

selecting the identifying number on said leaf color chart associated with the color panel most closely matching the color of said plant leaf,

correlating said selected identifying number with a calibration table and selecting a corresponding nutrient level based on said correlation; and

correlating said nutrient level with an assessment chart and selecting a corresponding nutrient status based on said correlation.

23. A method as recited in claim 22, wherein said calibration table comprises an array of nitrogen level entries, said table having a plurality of columns indexed according to said identifying numbers on said leaf color chart, said table having a plurality of rows indexed by a variety of plant, wherein said table provides a leaf nitrogen level value in percent.

24. A method as recited in claim 22, wherein said assessment chart comprises a graph of nitrogen status based on the leaf nitrogen level value derived from said calibration table compared to the plant growth stage for a plurality of varieties of plant, said assessment chart having a plurality of colored regions indicative of the nitrogen status of the plants, as being adequate, critical, deficient, or excessive.

25. A method as recited in claim 22, wherein said leaf comparing step comprises comparing the color of the whole field with the color panels of a leaf color chart.

26. A method as recited in claim 24, further comprising the steps of:

correlating said selected identifying number with a calibration table and selecting a corresponding phosphorous level based on said correlation; and

correlating said phosphorous level with an assessment chart and selecting a corresponding phosphorous status based on said correlation.

27. A method as recited in claim 24, further comprising the steps of:

correlating said selected identifying number with a calibration table and selecting a corresponding potassium level based on said correlation; and

correlating said potassium level with an assessment chart and selecting a corresponding potassium status based on said correlation.

28. A method as recited in claim 24, further comprising the steps of:

correlating said selected identifying number with a calibration table and selecting a corresponding magnesium level based on said correlation; and

correlating said magnesium level with an assessment chart and selecting a corresponding magnesium status based on said correlation.

29. A method for determining the colors of a leaf comparison color chart, comprising:

(a) analyzing the spectral reflectance characteristics of a plurality of plant leaves within a range of nutrient states;

(b) determining which of said reflectance characteristics is the most sensitive to change over the whole range of nutrient states;

(c) grading the colors of a color chart according to the characteristic found to be most sensitive to nutrient state change; and

(d) assigning a color value for each graded color that can be reproduced and made into a color panel that has the same reflectance characteristics as said plant leave within a range of nutrient states.

30. A method for determining the colors of a sample comparison color chart, comprising:

(a) providing plant samples from plants at a range of nutrient states, said nutrient states ranging from a deficient state to an excessive nutrient state;

(b) analyzing the spectral reflectance characteristics of said leaf samples within each range of said nutrient states;

(c) determining which of said reflectance characteristics is the most sensitive to change over the whole range of nutrient states;

(d) grading the colors of a color chart according to the characteristic found to be most sensitive to a nutrient state change; and

(e) assigning a color value for each graded color that can be reproduced and made into a color panel.

31. A method as recited in claim 30, wherein said reflectance characteristics comprise a luminescence variable, a red-green chromaticity variable, and a yellow-blue chromaticity variable.

32. A method as recited in claim 30, wherein said colors are graded according to the yellow-blue chromaticity reflectance characteristic.

33. A method as recited in claim 30, wherein the colors of said color panels are graded on the yellow (b+) spectral reflectance characteristics of said plant leaves at different nitrogen states.

34. A method as recited in claim 30, said method further comprising:

(a) obtaining spectral reflectance characteristics of a plant at a plurality of wavelength intervals between approximately 400 nm and approximately 700 nm to create a plant spectral profile; and

(b) fabricating a color panel with an assigned color that exhibits approximately the same spectral profile as obtained from said plant.